Temporal and Spatial Nutrient Evolution of the Lower Boise River, Southwest Idaho

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The lower Boise River in southwest Idaho becomes increasingly contaminated with nutrients. These increases could be attributed to non-point source contamination from agricultural land use and point source from waste water treatment facilities. Understanding the river chemistry and how it evolves spatially and temporally will help locate the areas that input the highest level of contamination as well as areas that contain the highest concentrations. To determine river chemistry, three separate synoptic sampling events were conducted along the approximately 64 miles from Diversion Dam to the Snake River. These sampling events were conducted in July 2012 during mid-irrigation season, October 2012 during the end of irrigation, and December 2012 during non-irrigation and historically the highest concentrations. Samples were collected every quarter to half mile with a higher frequency of samples taken between Star Idaho and Caldwell Idaho due to an increased number of inputs from tributaries and drainages. The samples were then analyzed at Boise State University for the anions bromine, chloride, fluoride, nitrate, nitrite, phosphate, and sulfate, using an E.P.A. 300.0 equivalent method. Data from laboratory analysis shows overall trends of increasing concentrations for all anions. Bromine, fluoride, and sulfate show similar trends between each sampling event with spikes in concentrations occurring at the same intervals. Nutrient behavior varied leading to questions on the cause of this variation. Point source nutrient spikes were identified at waste water treatment facility outlets to the lower Boise River, with the greatest spikes at the West Boise facility and the Caldwell facility. The largest non-point source spike was located approximately 27 miles east of Diversion Dam. Further sampling events are planned for March 2013, June 2013, and August 2013 to complete the annual water chemistry cycle and gain additional knowledge of the lower Boise River temporal and spatial evolution.